on changing conditions. Optimization may be based on only three (3) input parameters: input heat temperature, exhaust temperature, and the amount of heat available. The only actuators for control may be the switching times and durations of the relaxation and heat driven modes. Automation of the process can occur using a real-time optimized controller using a low-power embedded computer with cellular connectivity, such as the Raspberry Pi and/or Particle Electron, to allow remote control and data logging of operational units worldwide.

What is claimed is:

1. A method of distilling water, comprising the steps of:

a. providing a plurality of stages, each stage comprising a hot adsorbent bed and a cold adsorbent bed, and each stage has an upper and lower operating temperature limit, the difference between the upper and lower operating temperature limit being less than about 20° C.;

b. beginning a forcing phase, wherein the forcing phase comprises the steps of:

i. providing an external heat source to heat the hot bed of a first stage to a first temperature;

ii. desorbing water vapor from the hot bed of the first stage and flowing water vapor into a first condenser;

iii. condensing water vapor in the first condenser to form a liquid water and removing at least some of the liquid water from the first condenser;

iv. providing a solution comprising water and at least one dissolved impurity to a first evaporator, the solution having a temperature predetermined to suit the equilibrium uptake of an adsorbent, where a suitable temperature is predetermined by first selecting both a desired operational temperature range and uptake range for the adsorbent, then selecting the solution temperature such that the saturated water vapor partial pressure corresponds to the desired adsorbent temperature and uptake range;

v. transferring a forcing phase latent heat of vaporization from vapor condensing in the first condenser to the first evaporator to evaporate the solution comprising water and at least one dissolved impurity to form water vapor;

vi. adsorbing water vapor from the first evaporator into the cold bed of the first stage;

vii. transferring the heat of adsorption generated by the cold bed of the first stage to heat a hot bed of a second stage to a second temperature less than the first temperature using vapor generated through the conduction of heat from the cold bed of the first stage into at least one sealed tube and at least one sealed manifold chamber connecting the two beds, wherein the sealed tubes and chambers are evacuated of non-condensable gases and partially filled with a volatile liquid;

viii. repeating steps ii-vii for each of the plurality of stages until each of the beds has had water vapor desorbed from the bed or adsorbed into the bed;

ix. exhausting the heat of adsorption generated by the cold bed of the final stage externally; and

c. ending the forcing phase and beginning a relaxing phase, wherein the relaxing phase comprises the steps of:

x. transferring both the sensible heat of the adsorbent bed and the heat of adsorption from the hot bed of the first stage to the cold bed of the first stage using vapor generated through the conduction of heat from the cold bed of the first stage into at least one sealed tube and at least one sealed manifold chamber connecting the two beds, wherein the sealed tubes and chambers are evacuated of non-condensable gases and partially filled with a volatile liquid;

xi. desorbing water vapor from the cold bed of the first stage into the first condenser;

xii. condensing water vapor in the first condenser to form a liquid water and removing at least some of the liquid water from the condenser;

xiii. providing the solution comprising water and at least one dissolved impurity to the first evaporator;

xiv. transferring a relaxing phase latent heat of vaporization from vapor condensing in the first condenser to the first evaporator to evaporate the solution comprising water and at least one dissolved impurity to form water vapor;

xv. adsorbing water vapor from the first evaporator into the hot bed of the first stage, generating a heat of adsorption;

xvi. repeating steps x-xiii for each of the plurality of stages; and

d. ending the relaxing phase,

wherein the solution comprising water and at least one dissolved impurity is used to remove heat from at least one bed of at least one stage,

wherein at least a portion of the solution enters the first evaporator, and

wherein at least a portion of the solution is transferred from the evaporator of each stage to the evaporator of one or more subsequent stages.

2. The method according to claim **1**, wherein the plurality of stages are configured to use a serial flow pattern to achieve a water recovery ratio of at least 80%.

3. The method of claim **1**, wherein the solution comprising water and at least one dissolved impurity has been heated prior to being provided to the first evaporator by extracting sensible heat from the solution exiting at least one evaporator, the condensed liquid water exiting from at least one condenser, or both.

4. The method of claim **1**, wherein the first stage operates at temperatures between 60° C. and 210° C., and providing the plurality of stages comprises providing at least three stages.

5. The method of claim **1**, further comprising providing a plurality of solar cells to provide electrical power, and a plurality of solar thermal collectors to provide thermal power.

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